FIG. 1

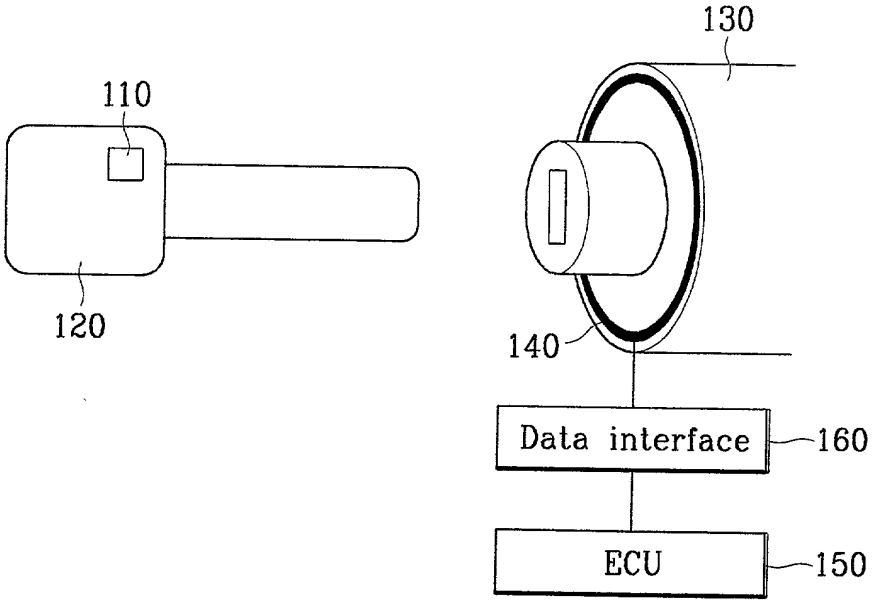


FIG.2

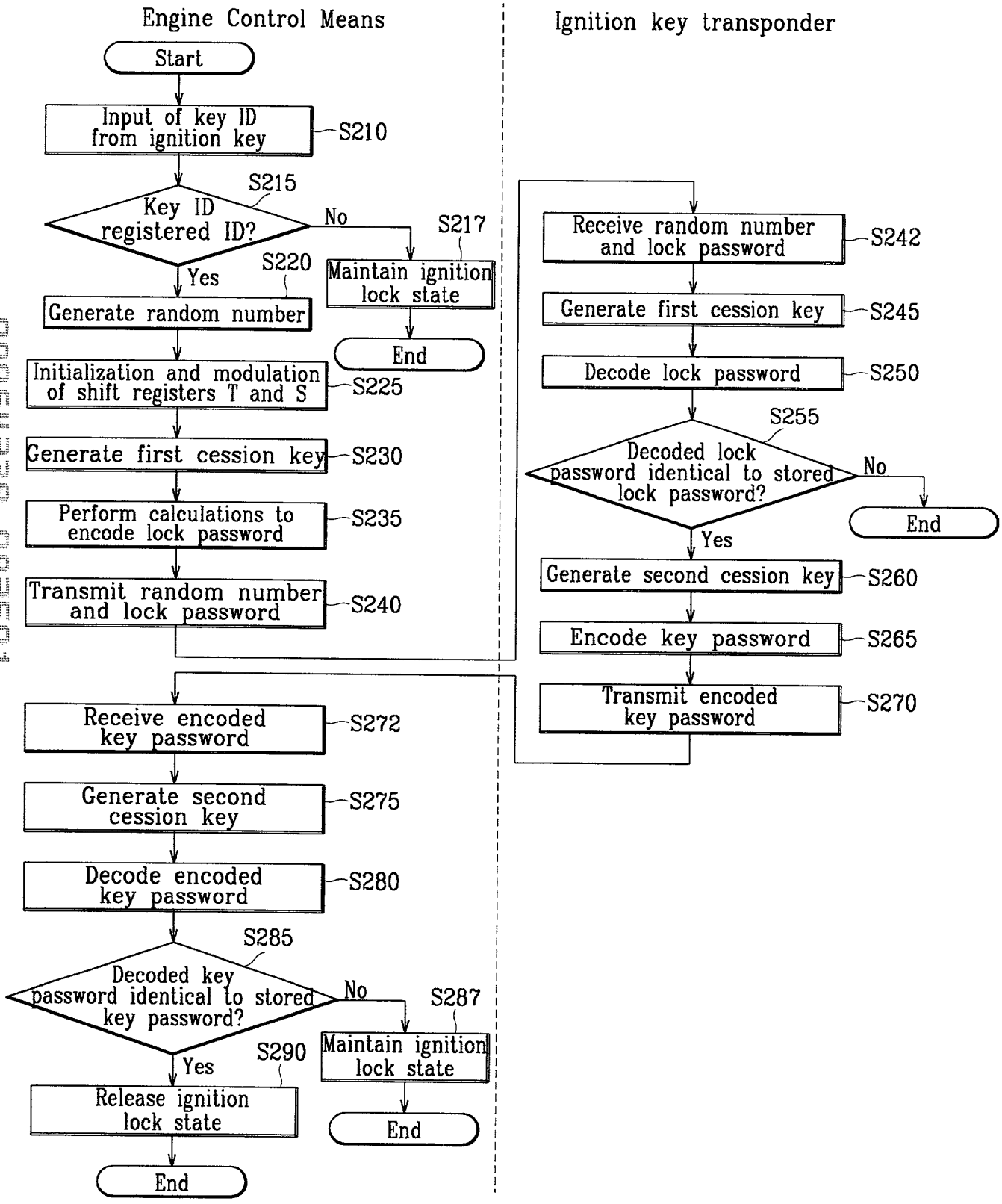

Engine Control Means
Ignition key transponder
Start
Input of key ID from ignition key
S210
S215
Key ID registered ID?
No
S217
Maintain ignition lock state
End
Yes
S220
Generate random number
Initialization and modulation of shift registers T and S
S225
Generate first cession key
S230
Perform calculations to encode lock password
S235
Transmit random number and lock password
S240
Receive random number and lock password
S242
Generate first cession key
S245
Decode lock password
S250
S255
Decoded lock password identical to stored lock password?
No
End
Yes
Generate second cession key
S260
Encode key password
S265
Transmit encoded key password
S270
Receive encoded key password
S272
Generate second cession key
S275
Decode encoded key password
S280
S285
Decoded key password identical to stored key password?
No
S287
Maintain ignition lock state
End
Yes
S290
Release ignition lock state
End

FIG.3

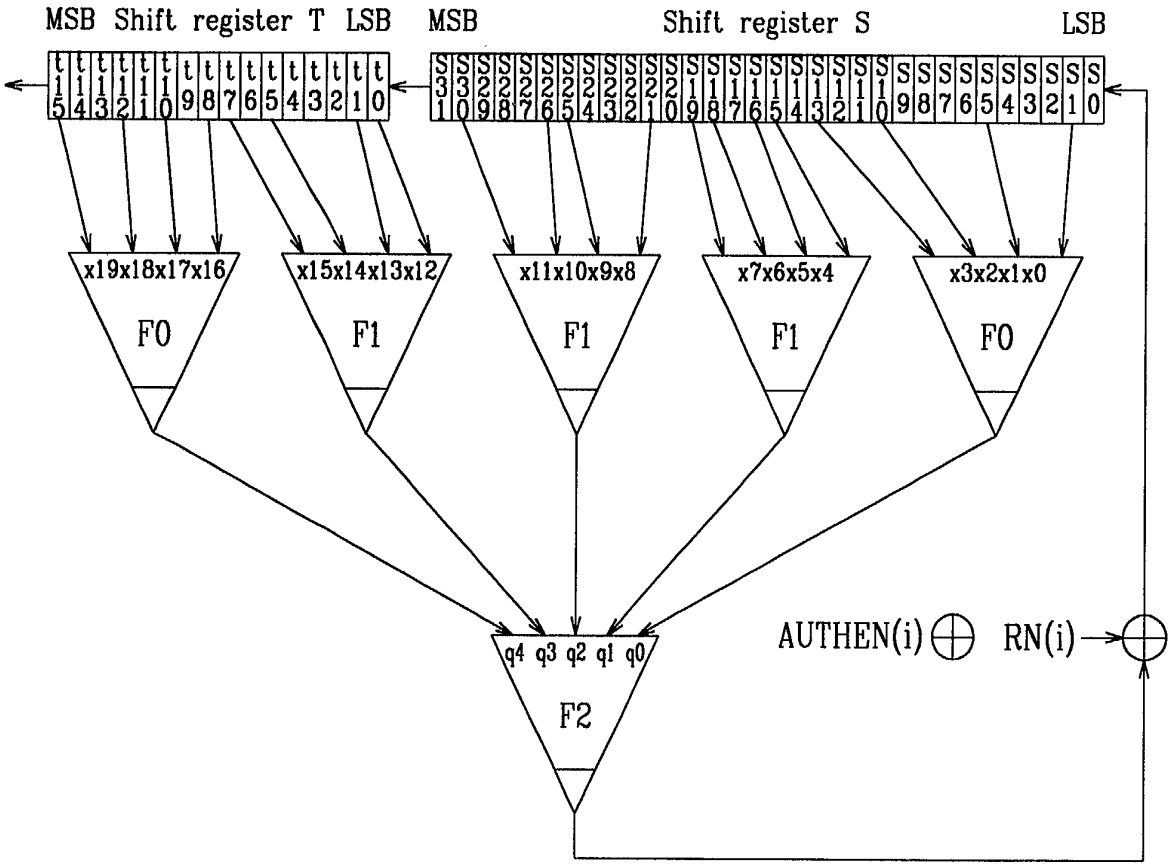

MSB Shift register T LSB
MSB
Shift register S
LSB
t15 t14 t13 t12 t11 t10 t9 t8 t7 t6 t5 t4 t3 t2 t1 t0
S31 S30 S29 S28 S27 S26 S25 S24 S23 S22 S21 S20 S19 S18 S17 S16 S15 S14 S13 S12 S11 S10 S9 S8 S7 S6 S5 S4 S3 S2 S1 S0
x19x18x17x16
F0
x15x14x13x12
F1
x11x10x9x8
F1
x7x6x5x4
F1
x3x2x1x0
F0
q4 q3 q2 q1 q0
F2
AUTHEN(i)
RN(i)

FIG.4

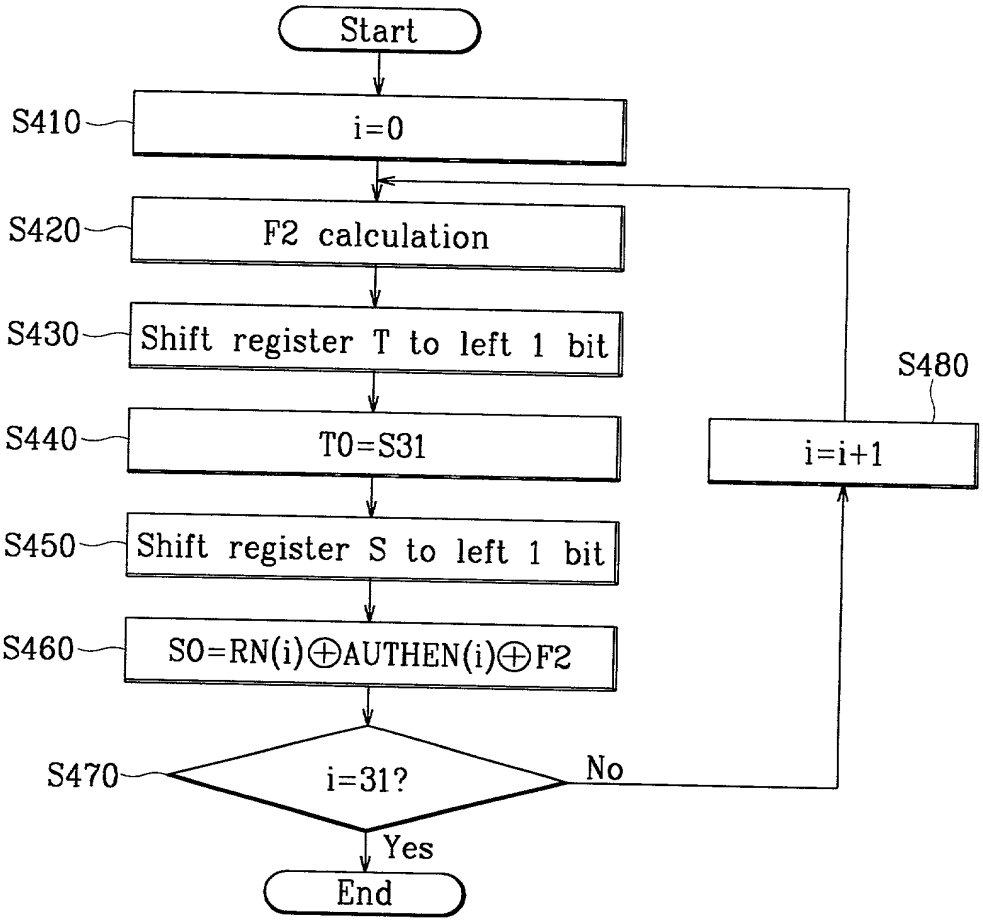

Start
S410
i=0
S420
F2 calculation
S430
Shift register T to left 1 bit
S440
T0=S31
S450
Shift register S to left 1 bit
S460
S0=RN(i)⊕AUTHEN(i)⊕F2
S470
i=31?
No
Yes
End
S480
i=i+1

FIG.5

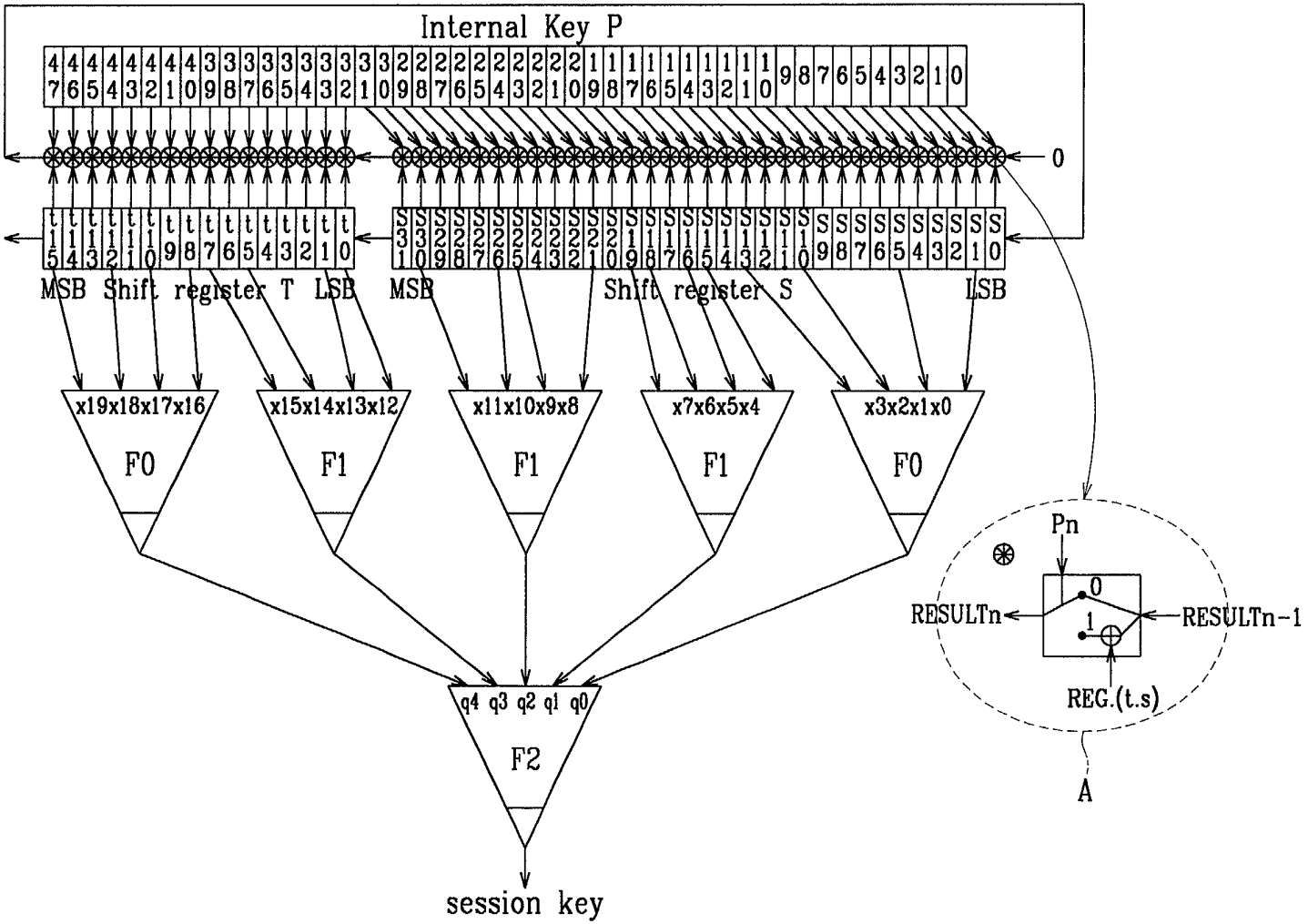

Internal Key P
47 46 45 44 43 42 41 40 39 38 37 36 35 34 33 32 31 30 29 28 27 26 25 24 23 22 21 20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0
0
t15 t14 t13 t12 t11 t10 t9 t8 t7 t6 t5 t4 t3 t2 t1 t0
S31 S30 S29 S28 S27 S26 S25 S24 S23 S22 S21 S20 S19 S18 S17 S16 S15 S14 S13 S12 S11 S10 S9 S8 S7 S6 S5 S4 S3 S2 S1 S0
MSB Shift register T LSB
MSB
Shift register S
LSB
x19x18x17x16
F0
x15x14x13x12
F1
x11x10x9x8
F1
x7x6x5x4
F1
x3x2x1x0
F0
q4 q3 q2 q1 q0
F2
session key
Pn
0
1
RESULTn
RESULTn-1
REG.(t.s)
A

FIG.6

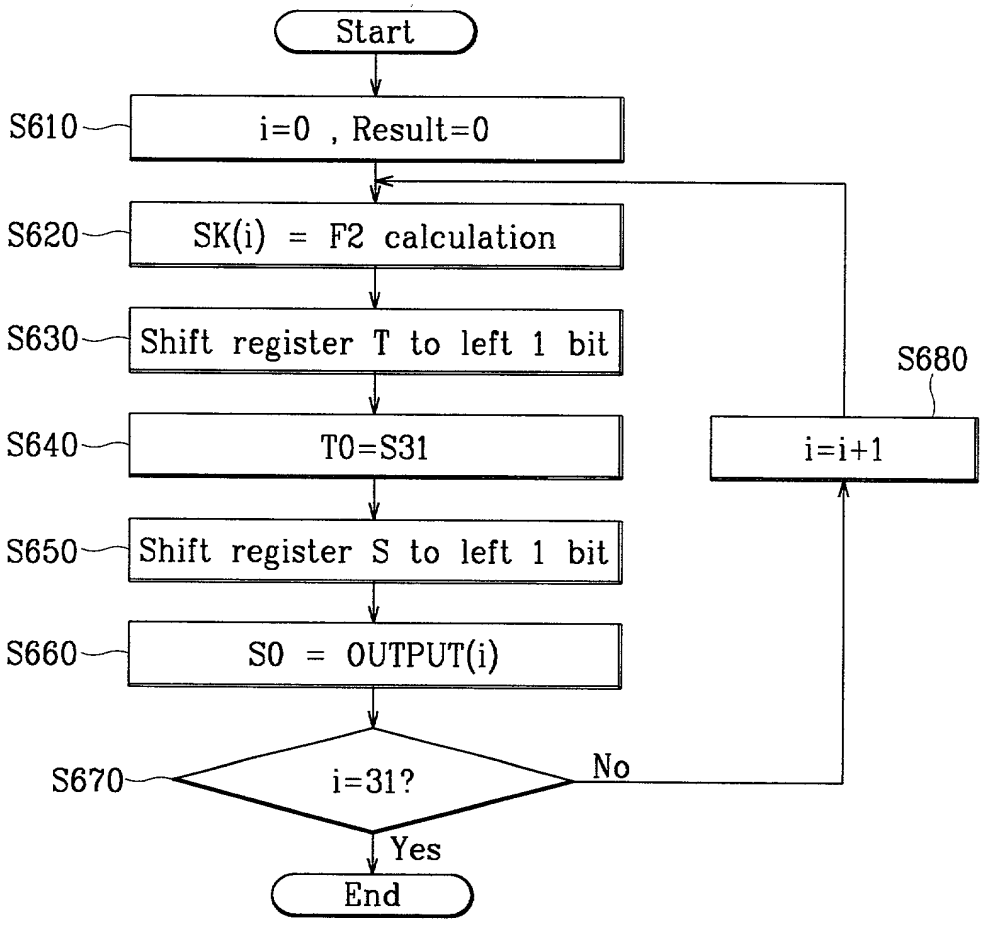
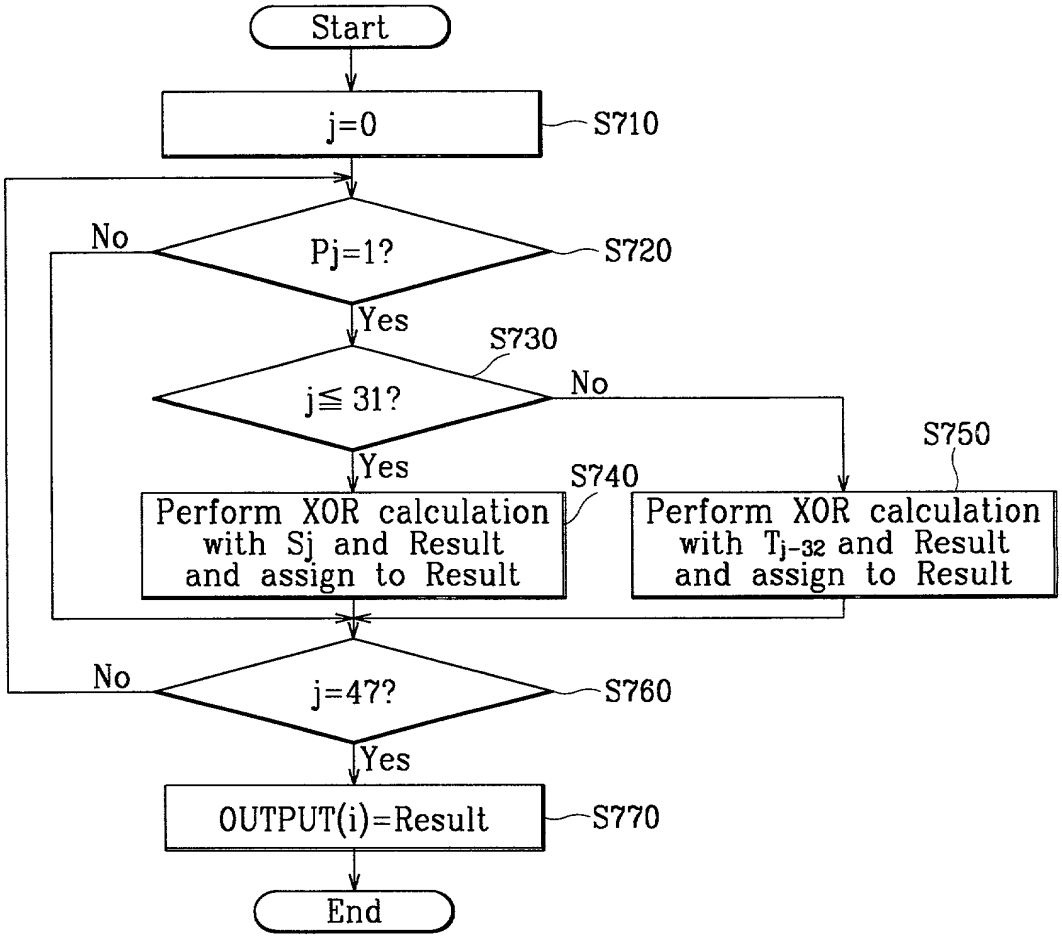

Start
S610
i=0 , Result=0
S620
SK(i) = F2 calculation
S630
Shift register T to left 1 bit
S640
T0=S31
S650
Shift register S to left 1 bit
S660
S0 = OUTPUT(i)
S670
i=31?
No
Yes
End
S680
i=i+1

FIG. 7


Start
j=0
S710
Pj=1?
S720
No
Yes
S730
j≦31?
No
Yes
S740
Perform XOR calculation with Sj and Result and assign to Result
S750
Perform XOR calculation with T_{j-32} and Result and assign to Result
j=47?
S760
No
Yes
OUTPUT(i)=Result
S770
End